

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**  
(Chapter II of the Patent Cooperation Treaty)  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P60197PCT	<b>FOR FURTHER ACTION</b>		See Form PCT/IPEA/416	
International application No. PCT/EP2004/009436	International filing date (day/month/year) 19.08.2004	Priority date (day/month/year) 12.09.2003		
International Patent Classification (IPC) or national classification and IPC C25D5/56, C25D5/06, C25D7/00, C25D7/06, C25D17/10, C25D17/00				
Applicant ATOTECH DEUTSCHLAND GMBH et al.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of 5 sheets, as follows:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</li> <li><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</li> </ul> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)), containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Box No. I Basis of the opinion</li> <li><input type="checkbox"/> Box No. II Priority</li> <li><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li><input type="checkbox"/> Box No. IV Lack of unity of invention</li> <li><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li><input type="checkbox"/> Box No. VI Certain documents cited</li> <li><input type="checkbox"/> Box No. VII Certain defects in the international application</li> <li><input type="checkbox"/> Box No. VIII Certain observations on the international application</li> </ul>				
Date of submission of the demand  24.02.2005	Date of completion of this report  09.12.2005			
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Teppo, K-M Telephone No. +49 89 2399-8130			
				

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- which is electrically connected to the one pole of an electroplating current source;
- e) at least one contacting device (9-16) which is electrically connected to the other pole of the electroplating current source and establishes contact with the moving plastic film and is situated outside the chamber; and
  - f) wherein said conveying device further comprises at least one pair of squeezing rolls (20, 21) at both the inlet and at the outlet of each electroplating chamber and wherein the circumferential speed of the pairs of squeezing rolls increases in the direction of movement of the plastic film; and the conveying device is set up such that the plastic film runs horizontally in the entire region of the chamber which can be charged with electrolyte.

(See D1, claims 1 and 2; Figures 1 and 2; col. 8, l. 22 - col. 10, l. 25).

The subject-matter of claim 1 therefore differs from that of D1 in that the spacing between the two contacting electrodes does not exceed a few centimetres. Whereas in D1, this spacing is preferably 40-80 cm, (See D1: col. 9, lines 5-8).

The subject-matters of claims 1 and 24 are therefore new (Article 33(2) PCT).

- 2.2 D2 is silent on the exact spacing dimensions, it merely states the transport steps have to be adapted to the spacing between the "Streifkontakte" (20). However, from the figures it is impossible to verify to what centimetre length this would correspond. The only reference to dimensions in D2 is the thickness of the isolation coating (12), which is 0.15 mm and does not particularly help.  
D3 is not regarded as particularly relevant.
- 2.3 The problem to be solved by the current application can therefore be formulated as how to efficiently and reliably manufacture conductive structures on small electrically conductive structures that are electrically insulated from each other.
- 2.4 The solution to this problem proposed in claims 1 or 24 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:  
It appears that only the applicant has realized that the following conditions need to

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10/566227  
**IAP20 Rec'd PCT/PTO 27 JAN 2006**

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**Box No. I Basis of the report**

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
  - This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
    - international search (under Rules 12.3 and 23.1(b))
    - publication of the international application (under Rule 12.4)
    - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

**Description, Pages**

1-35 as originally filed

**Claims, Numbers**

4-17, 28(part), 29-34 as originally filed  
2, 3, 18-23, 25-27, 28(part) received on 24.02.2005 with letter of 21.02.2005  
1, 24 filed with telefax on 28.11.2005

**Drawings, Sheets**

1/7-7/7 as originally filed

- a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3.  The amendments have resulted in the cancellation of:
  - the description, pages
  - the claims, Nos.
  - the drawings, sheets/figs
  - the sequence listing (*specify*):
  - any table(s) related to sequence listing (*specify*):

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- the description, pages
- the claims, Nos.
- the drawings, sheets/figs
- the sequence listing (*specify*):
- any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes:	Claims	1-34
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-34
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-34
	No:	Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**Re Item I**

**Basis of the report**

1. The applicant has amended the independent claims to include the approximate size of the small spacings (for disclosure see page, original description page 6) and defined that the small structures have to be in permanent electrical contact with at least one of the contacting electrodes (see e.g. original claim 4).

**Re Item V.**

1. The following documents are referred to in this communication:  
D1: US 5 425 862 A (HARTMANN BERND ET AL) 20 June 1995 (1995-06-20)  
D2: DE 100 43 814 C (HUEBEL EGON) 11 April 2002 (2002-04-11)  
D3: US-A-5 188 720 (COLIN GERARD ET AL) 23 February 1993 (1993-02-23)
  2. The application relates to a device and a method for electrolytically treating small electrically conductive structures on surfaces of work pieces. Documents D1-D3 relate to plating of board-shaped or foil material which is continuously electrically conductive at the surface thereof. Even if the independent claims were to be read in their broadest form i.e. read so that they merely have to be suitable for electrolytically treating such devices, the further requirement of the independent claims relating to the size of the spacing between the contacting electrodes are not met by these documents.
- 2.1 Document D1, which is regarded as the closest prior art document, discloses an apparatus for the electroplating of thin plastic films, provided on one or both sides with a conductive coating, which comprises:
- a) at least one assigned supply reel (2, 4) for the plastic film to be electroplated;
  - b) at least one assigned supply reel for the electroplated plastic film;
  - c) a conveying device which conveys the plastic film continuously from one supply reel to the other;
  - d) at least one chamber (6-8) which can be charged with electrolyte, which chamber lies between the supply reels and in which there is located in the vicinity of the path of movement of the plastic film at least one anode (24, 25)

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apply, namely the dimensions of the spacings between the electrodes have to be few centimetres in order to enable permanent electrical contact (i.e. allowing permanent coating process) between the electrodes and the small structures.

3. Claims 2-23 and 25-34 are dependent on claims 1 or 24 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

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Atotech Deutschland GmbH  
28 November 2005

## Claims:

1. A device for electrolytically treating electrically conductive structures on surfaces of work pieces (1) the structures being electrically insulated against each other, by using a method comprising continuously conveying the work pieces (1) on a conveying path and in a direction of transport with the structures being electrolytically treated thereby, said device comprising:
  - a) at least one arrangement, comprising at least one electrolysis region, in a respective one of which at least one counter electrode (4) and the work pieces (1) can be brought into contact with the processing liquid, and, assigned to each one of said at least one electrolysis region, an assembly of at least two electrodes (6, 14) each for contacting the work pieces (1), at least one of said at least two contacting electrodes (6, 14) of each assembly being disposed on one side of a respective transport section leading through said one electrolysis region and at least another one of said contacting electrodes (6, 14) on the other side of said transport section,
  - b) the at least two contacting electrodes (6, 14) of each assembly being disposed outside of said at least one electrolysis region and not being in contact with the processing liquid,
- 10 characterized in that the spacing between the at least two contacting electrodes (6, 14) of each assembly does not exceed a few centimeters and is so small
- 15 that small structures are permanently electrically contacted by at least one contacting electrode as the work pieces are conducted through the device.
- 20
- 25

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## Claims:

1. A device for electrolytically treating electrically conductive structures on surfaces of work pieces (1) the structures being electrically insulated against each other, by using a method comprising continuously conveying the work pieces (1) on a conveying path and in a direction of transport with the structures being electrolytically treated thereby, said device comprising:
- a) at least one arrangement, comprising at least one electrolysis region, in a respective one of which at least one counter electrode (4) and the work pieces (1) can be brought into contact with the processing liquid, and, assigned to each one of said at least one electrolysis regions, an assembly of at least two electrodes (6, 14) each for contacting the work pieces (1), at least one of said at least two contacting electrodes (6, 14) of each assembly being disposed on one side of a respective transport section leading through said one electrolysis region and at least another one of said contacting electrodes (6, 14) on the other side of said transport section,
  - b) the at least two contacting electrodes (6, 14) of each assembly being disposed outside of said at least one electrolysis region and not being in contact with the processing liquid,
- characterized in that the spacing between the at least two contacting electrodes (6, 14) of each assembly is so small that the structures can permanently be electrically contacted by at least one contacting electrode (6, 14), if the structures have a dimension of as low as 2 cm.
2. The device according to claim 1, characterized in that electrically conductive structures of 5 cm can electrolytically be treated.
3. The device according to any one of the preceding claims, characterized in that at least two contacting electrodes (6, 14) are provided, at least one of them being disposed on one side of the electrolysis region and the at least other one on the other side of the electrolysis region.

18. The device according to any one of the preceding claims, characterized in that the at least one contacting electrode (6, 14) is cathodically polarized.

19. The device according to claim 18, characterized in that the at least one counter electrode (4) is an insoluble anode.

5 20. The device according to claim 19, characterized in that the anode (4) is a flood anode.

10 21. The device according to any one of the preceding claims, characterized in that the at least one contacting electrode (6, 14) and the at least one counter electrode (4) are disposed on a common carrier frame (5).

15 22. The device according to any one of the preceding claims, characterized in that it further respectively comprises at least one first and one second storing facility for storing the work pieces (1).

20 23. The device according to claim 22, characterized in that it further comprises conveying members (18, 25) for conveying the work pieces (1) through the device from the at least one first storage facility to the at least one second storage facility.

25 24. A method for electrolytically treating electrically conductive structures on surfaces of work pieces (1), the structures being electrically insulated against each other, the method comprising:

- a) continuously conveying the work pieces (1) on a conveying path and in a direction of transport through at least one electrolysis region,
- b) bringing the at least one counter electrode (4) and the work pieces (1) into contact with the processing liquid in said at least one electrolysis region,
- c) bringing the work pieces (1) into contact with an assembly of at least two contacting electrodes (6, 14), each assembly being assigned to one of said at least one electrolysis regions, outside of the at least

24. A method for electrolytically treating electrically conductive structures on surfaces of work pieces (1), the structures being electrically insulated against each other, the method comprising:

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- a) continuously conveying the work pieces (1) on a conveying path and in a direction of transport through at least one electrolysis region,
- b) bringing the at least one counter electrode (4) and the work pieces (1) into contact with the processing liquid in said at least one electrolysis region,
- c) bringing the work pieces (1) into contact with an assembly of at least two contacting electrodes (6, 14), each assembly being assigned to one of said at least one electrolysis region, outside of the at least one electrolysis region, at least one of said at least two contacting electrodes (6, 14) of each assembly being disposed on one side of a respective transport section leading through said one electrolysis region and at least another one of said contacting electrodes (6, 14) on the other side of said transport section,
- d) preventing the at least two contacting electrodes (6, 14) of each assembly from contacting the processing liquid.

20  
25 characterized in that the spacing between the at least two contacting electrodes (6, 14) of each assembly does not exceed a few centimeters and is so small that small structures are permanently electrically contacted by at least one contacting electrode as the work pieces are conducted through the device.

least one electrolysis region, at least one of said at least two contacting electrodes (6, 14) of each assembly being disposed on one side of a respective transport section leading through said one electrolysis region and at least another one of said contacting electrodes (6, 14) on the other side of said transport section, preventing the at least two contacting electrodes (6, 14) of each assembly from contacting the processing liquid,

characterized in that the spacing between the at least two contacting electrodes (6, 14) of each assembly is so small that the structures can permanently be electrically contacted by at least one contacting electrode (6, 14), if the structures have a dimension of as low as 2 cm.

15 25. The method according to claim 24, characterized in that electrically conductive structures of 5 cm can electrolytically be treated.

26. The method according to any one of claims 24 and 25, characterized in  
that the work pieces (1) are at first brought into contact with a contacting  
electrode (6, 14), are then passed through an electrolysis region and are then  
brought again into contact with a contacting electrode (6, 14).  
20

27. The method according to claim 26, characterized in that the electrolysis  
region is chosen to be so short that the electrically conductive structures are in  
constant electrical contact with one of the contacting electrodes (6, 14) as they  
are being passed through the electrolysis region.

28. The method according to any one of claims 24 - 27, characterized in  
that the work pieces (1) are guided in a horizontal direction of transport through  
at least one electrolysis region contained in a respective one of the processing  
modules (M, M1, M2, M3, M4, M5, M6), the work pieces (1) being conducted  
into the module through (M, M1, M2, M3, M4, M5, M6) at least one passage  
located on the entrance side thereof and being conducted out of said module  
(M, M1, M2, M3, M4, M5, M6) through at least one passage located on the exit  
side thereof, said work pieces (1) being electrically contacted by means of at